WHOLE BLOOD MIXING

A Synopsis of an Evaluation Performed by

The Montreal Centre of Canadian Blood Transfusion,

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Background:
Canadian blood collection centers were interested in evaluating automated blood collection systems to provide enhanced mixing to prevent micro-clotting. A testing method was developed to evaluate the mixing of anticoagulant and whole blood from actual donors during the donation process. The hypothesis was that SEBRA's new proprietary mixing action would yield better anticoagulant-to-blood mix.

Materials and Methods:
Units of whole blood (n=21) were used. Prior to the donation, 3 ml of anticoagulant (CPDA) was replaced with 3 ml of trypan blue, a dye of the same specific gravity of the CPDA. Three separate studies were conducted: ten of the recipient bags were collected using a "standard" SEBRA Shaker (Model 1020), five of which had samples extracted directly after collection, while five had additional manual mixing provided prior to the sample collection; eleven bags were collected using the enhanced digital SEBRA Shaker (Model 1040) with no manual mixing. (Note: the Model 1020 is at least comparable in capability to other international mixing devices.)

After the donation, seven samples were drawn from each unit; the first samples were 10 cc (as per standard specimen tube) of unmixed blood directly from the tubing between the needle and the blood bag; the second samples were 10 cc of mixed blood from the donor bag ; the next four samples were 2.5 cc each of mixed blood from the blood bag; the last sample was 10 cc, and was collected only after additional manual mixing to represent maximal mixing.

Mixing was measured by allowing the plasma to separate in the sample tubes after collection. The amount of trypan blue mixed into the plasma was determined by measuring the Optical Density (OD) of the plasma at 580 nm. The higher the OD, the greater the mixing. An OD of 0.8 was determined to represent complete, optimal mixing (100% mixing of anticoagulant and blood). Unmixed blood, having no dye added, has an OD of 0.0 and 0% mixing.

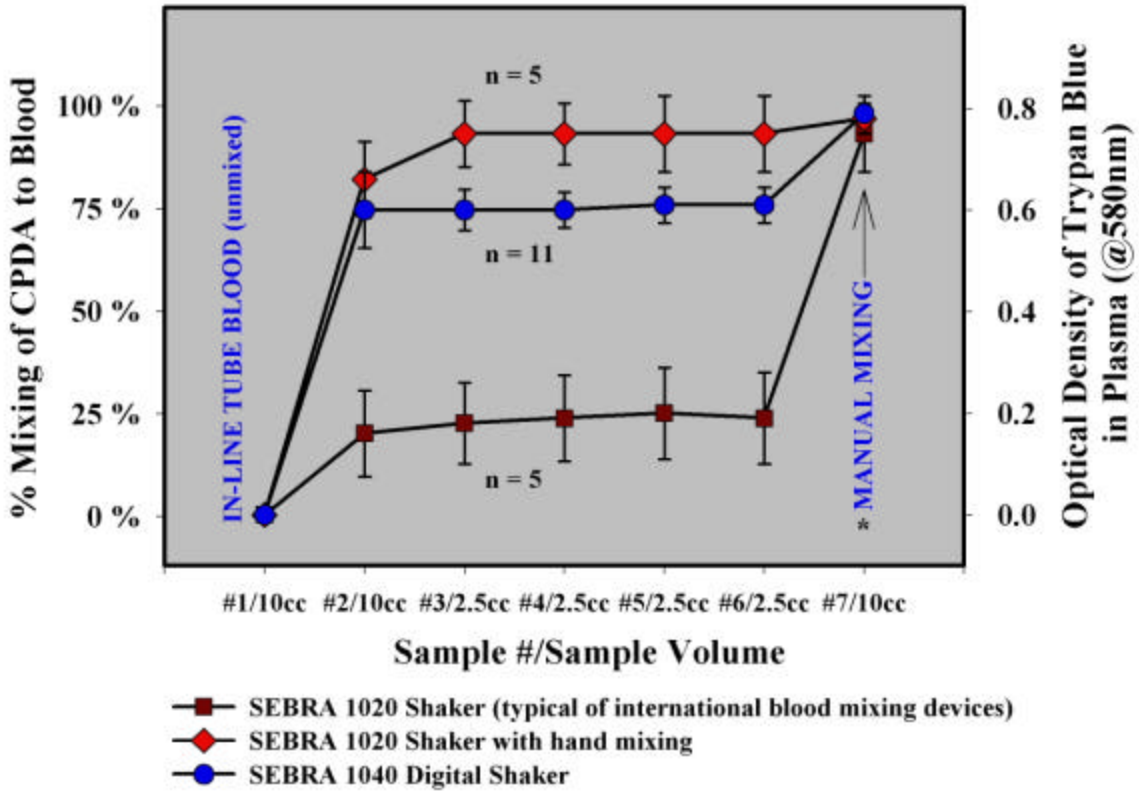
Results:
As demonstrated on the following graph, the Model 1040 Shaker provided a higher amount of mixing, approximately 75%, compared to the Model 1020 Shaker level of mixing, approximately 25%. Vigorous manual mixing after collection provided the greatest mixing, typically in the high 90% range.

Conclusion:
Automated blood collection devices provide varying degrees of mixing capability. The results demonstrate the SEBRA Model 1040 Shaker provides a greater level of mixing than do predecessor devices.

Anecdotal and empirical evidence of both Canadian Blood Services and the Southern Arizona Chapter of the American Red Cross indicates that clotting can be avoided and the viability of blood components enhanced by providing automated mixing throughout the blood collection process. Both organizations are processing 100% leukocyte reduced blood, both organizations have a lower than 0.3% loss due to clogged filters, and both organizations use only automated mixers for whole blood collection.

Figure 1: Automatic Mixing of Dyed Anticoagulant with Blood

Canadian Blood Services



***In all three studies, sample #7 included vigourous manual mixing of the blood bag prior to the sample draw.**

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